Original Research Article

Examining our laboratory results through participation in multinational material exchange studies

ABSTRACT

Aim: The aim of this study is to determine the quality of our tissue processing through participation a multicentre research programme as part of external quality control.

Study Design: A analytical retrospective study.

Place and Duration of Study: Department of Pathology University of Calabar Teaching Hospital, July 2019.

Methodology: An analytical study reviewing the performance of lymphoma tissue contributed to a Sub-Saharan African Lymphoma consortium study commissioned in 2008/2009 for which results were published in 2012. Twelve formalin fixed paraffin embedded lymphoma tissue were tested with a panel of 40 immunohistochemistry antibodies. The tissues were cut into 480 cores placed on slides before the test.

Results: The tissues were from 5 women and 7 men. The mean age was 37years, median age 45 years and modal age was 60 years.Twenty six percent of the sectioned cores lifted at test an could not therefore produce results.The reason for the lift off was tissue brittleness. Seventy four percent (74%) had intact cores on slides and produced a staining reaction although fragile antibodies like Ki 67 and bcl6 produced non reliable results while hardy antibodies like CD20 were more reliable.

CONCLUSION: The quality of histopathology biopsy results in the Department of Pathology University of Calabar teaching hospital needs to be improved. The strategies to achieve this involves the institution of continuous quality control and quality assurance.

Keywords: Quality *control,quality assurance,Calabar*

INTRODUCTION: Approaches to instituting quality control (QC) and quality assurance (QA) in Anatomic pathology may vary, but the result is the same. A laboratory for instance set up its QC committee with a mandate to assess two levels of QC, these are external quality control(EQA) and internal quality control (IQC)(1).IQC involved inter and intradepartmental seminars to improve the process, turnaround time, monitoring errors and troubleshooting on abnormal occurrences. EQA activities involve participation in external proficiency activities as well as bench marking with remote centres(1).In America the association of Anatomic directors published three articles on quality control; these have shaped quality management in Anatomic pathology(2). The first is concerned with internal quality assurance which emphasizes turnaround time and reliability of the diagnosis(2). The second article was concerned with the standardization of the pathology report. The third article was centred on the standardization of the consultation in Anatomic pathology(2).

An erroneous laboratory result exposes a patient to harm(3).Quality assurance activities must address the three phases of the histopathological test cycle; these are the preanalytical, analytical, and post analytical(4). The preanalytical phase, is said to account for most of the errors(4-6), this why it is often taken seriously in the laboratory(7, 8).Subjectivity in histopathology and cytopathology reports makes instituting QC in these test difficult. To overcome this shortcoming, the bulk of laboratory QC activities centre on internal quality control.(9, 10).In large laboratories, it may be technically impossible to peer

review all results issued .An ingenious way one laboratory set out its QC was to set up an internal QC committee and peer review mechanism which selects through systematic random sampling 10% of the previous week reports for review(10).The peer review led to comments to be made on made 19.6% of the results(10). Comments which range from microscopic description(4%) through macroscopic description (3.1%),to 0.3 % incorrect results, examined all aspect of the test process(10).They summarized the positive outcome of instituting IQC to include:1 Stimulus at both conscious and subconscious level to be always accurate;2 more frequent case consultation among pathologists;3 uniformity in diagnostic terminology, grading system and criteria among Pathologists;4 feed back to the scientific and technical staff in terms of the technical quality and productivity of the department, among others(10).

We present a snapshot review of an earlier participation in a multicentre lymphoma study, by evaluating the performance of our histology blocks as an external quality control for tissue biopsy. The focus of the laboratory is to establish an enduring quality management system. In the next articles we shall examine several aspects of internal quality controls as they exist before we institute a more robust quality management.

MATERIALS AND METHODS: A retrospective study of the performance of randomly selected formalin fixed paraffin embedded (FFPE) lymphoma tissue contributed to a Sub Saharan Africa lymphoma consortium study was carried out. Sixteen (16) FFPE tissue blocks from 14 lymphoma cases were contributed. Of the FFPE blocks selected two (2) were from 2007 collection, three from 2008 collection and the rest from 2009 collection. Four of the FFPE blocks from two patients diagnosed as human immunodeficiency virus (HIV)associated lymphoma followed a different analysis pathway and thus excluded from the study. The remaining 12 FFPE blocks were subjected to immunohistochemistry analysis and cores were taken for tissue microarray analysis. Those treated to immunohistochemistry analysis are included in the study while the tissue microarray processed cores are excluded from this study. The tissues were subjected to a panel of 40 antibodies. Feedback was sent to us as hard copies and electronic copies and comprised of general comments and results of immunohistochemical analysis. The data is fed into excel Microsoft statistical package for analysis.

RESULTS: Twelve FFPE lymphoma tissue from 5 females and 7 males were analysed. This is represented in a bar chart in figure 1.

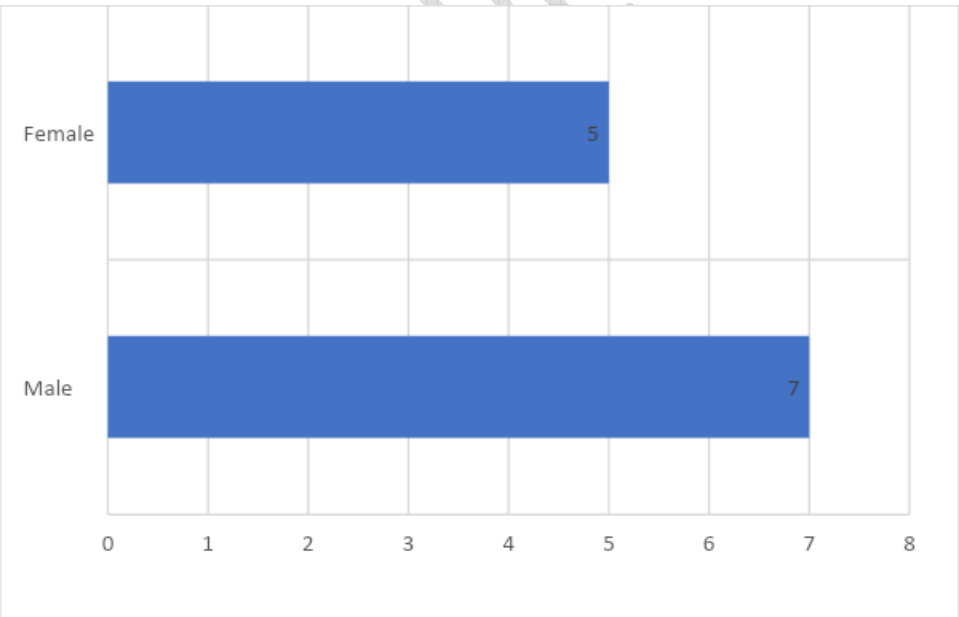

Figure 1. Bar Chart Showing the Sex Distribution of Patients from Whom FFPE Were Selected for Study

Table 1. The Age Distribution of Patients in the Study

Age groups	Frequency	Percentages
<21	5	42
21-30	0	0
31-40	1	8
41-50	1	8
51-60	4	34
61-70	1	8
Total	12	100

The youngest patient was 3 years and the oldest 70 years, the range being 3 -70 years. This is represented in table 1 and the bar chart in figure 2. The mean age of patients was 37, median age was 45 and modal age was 60 years.

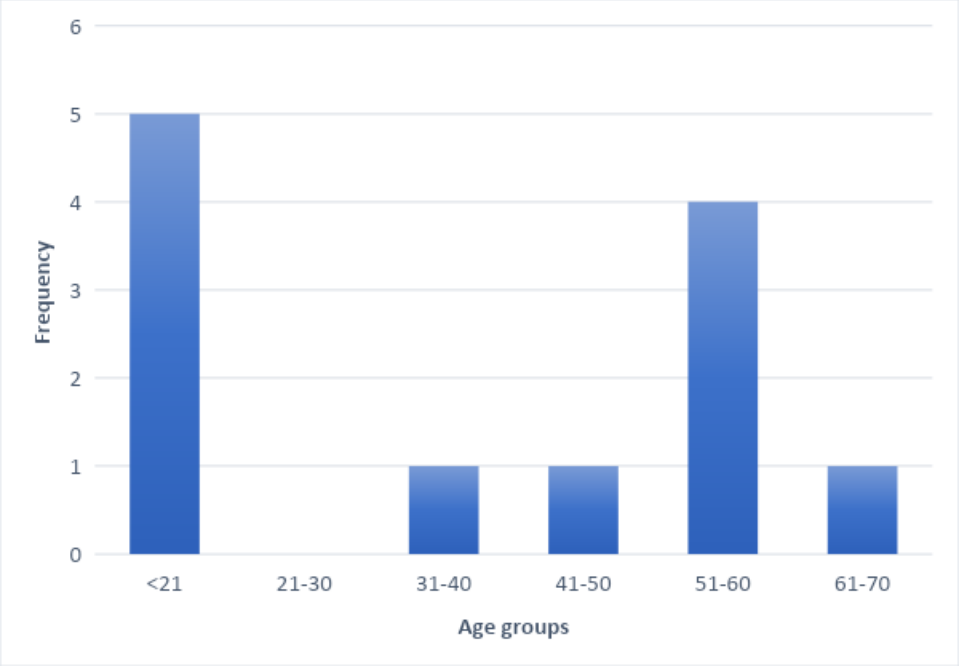

Figure 2. Bar Chart Showing the Age Distribution of Patients

The EQA statement was that our tissues were not optimally fixed, and the ideal fixative neutral buffered formalin was not used. The unbuffered fixative employed in our centre is usually acidic and may have affected the antigen recovery in immunohistochemistry. That processing may have distorted the cellular morphology and the tissue fragility resulted in lack of adhesiveness to the glass slide. The immunohistochemistry result was affected by the acidic formalin with less avid antibodies such as Ki67 and bcl16 staining poorly while CD20 staining was more reliable. The morphologic diagnosis from our centre was judged to be good.

A total of 40 antibody panels employed in lymphoma diagnosis were tested for each of the 12 lymphoma patients and this amounted to a total of 480 cells. Brittle tissue sections did not adhere to the glass slide and were marked as no core NC and therefore no staining reaction was expected in such cells. The total number of NC recorded was 132.

Table 2. Distribution of Cores

TOTAL NO OF CORES THAT FELL OFF (NC)	TOTAL NO OF INTACT CORES	TOTAL NO OF CORES
132	384	480

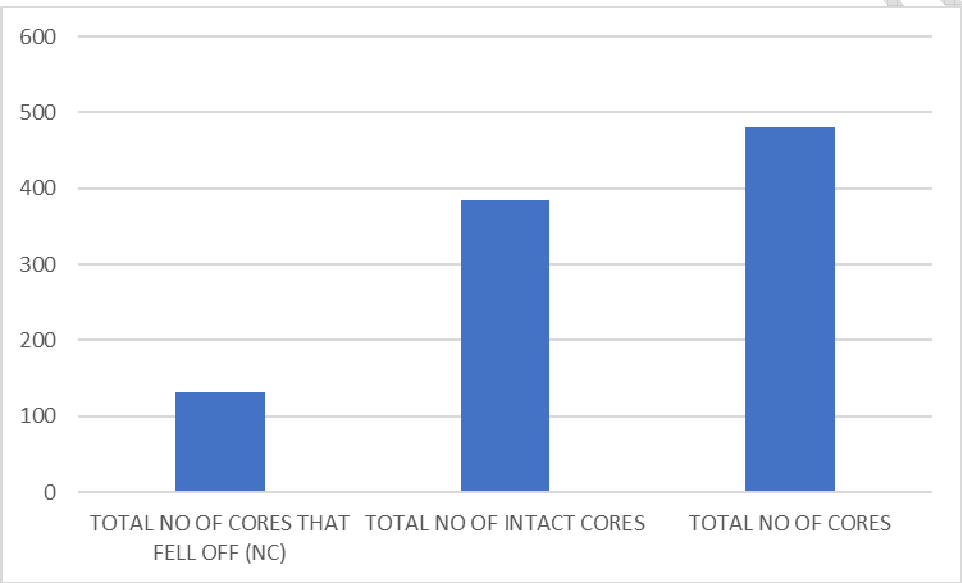

Figure 3. Bar diagram showing the behaviour of cores

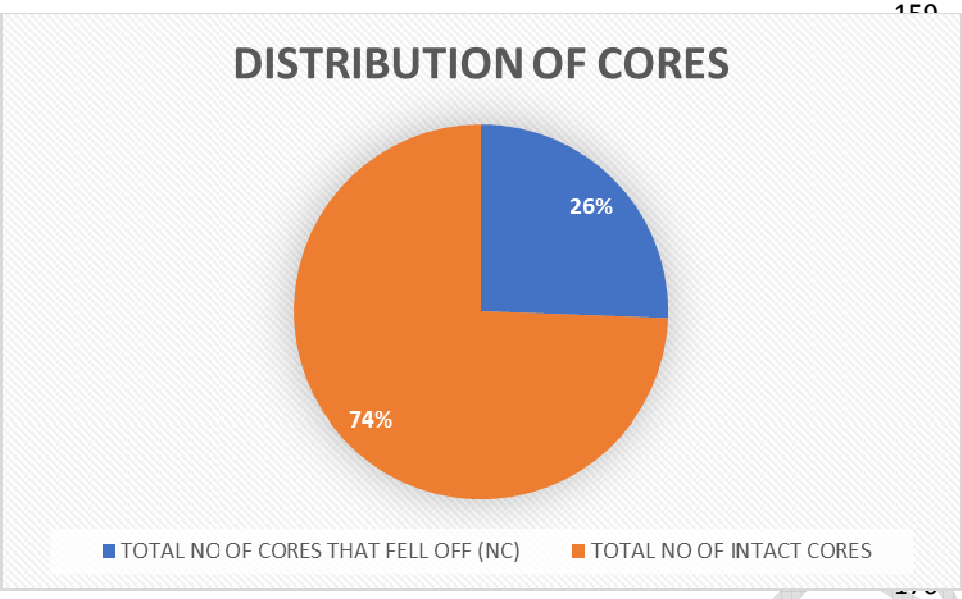

Figure 4. Graphical representation of core distribution

DISCUSSION: The performance of our tissue in this unintended EQA was an eye opener and opens the door for necessary improvement in our quality. A 26% fall off rate in our tissue cores in immunohistochemisistry is undesirable. The initial handling of a tissue in histopathology from the preanalytical phase to the analytic phase is of utmost importance(4, 5, 11). Very often following the basic analysis with Haematoxylin and eosin staining, the tissue is then subjected to complex array of test which may determine the type of therapeutic intervention and ultimately the prognosis. If the tissue had been man handled the information could be lost and the patient the worse for it.The need for pathological diagnosis is increasing as non-communicable diseases increase in the developing world especially(12). The laboratories must brace up for this challenge by providing quality test results(12).

Robust internal quality assurance measures will need to be put in place in our laboratory to improve the quality of our laboratory results. This requires extreme commitment of time and resources, but this must be done for the sake of our patients. The method of continuous internal quality assurance which seeks to review 10% of the test result at every step of the test process seems the most feasible to adopt(10, 11, 13-15).In this cost conscious era and so as to satisfy accreditation bodies that are beginning to ask questions the institution of QC and QA is the way forward(1, 16, 17).Just as College of American Pathologist has driven QC and QA (18, 19), in Nigeria College of Nigerian Pathologist and the Federal ministry of health are beginning to drive the process. In conclusion, a good laboratory test result must be accurate, timely, reliable and must satisfy the client. It does appear that until we improve our process the test results are not very reliable.

CONCLUSION: The quality of histopathology biopsy reports from our department needs improvement. This can be achieved through the institution of continuous internal quality control and other quality assurance measures**.**

RECOMMENDATIONS. The recommendation of the author is the immediate institution of continuous internal quality control, as well as external quality control participation.Management of the hospital and laboratory should support the laboratory with resources to enable it achieve these goals**.**

COMPETING INTEREST: The author declares no competing interest.

CONSENT:No consent was required for this work.

ETHICAL APPROVAL: Ethical approval was granted by the institutional ethical review board.

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